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10/562,445

12/27/2005

Francis Garnier

126375

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25944 7590 02/09/2011

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EXAMINER

BASTIANELLI, JOHN

ART UNIT

PAPER NUMBER

3753

NOTIFICATION DATE

DELIVERY MODE

02/09/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/562,445 | <b>Applicant(s)</b><br>GARNIER, FRANCIS |  |
|                              | <b>Examiner</b><br>John Bastianelli  | <b>Art Unit</b><br>3753                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3-12 and 15-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-12 and 15-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2010 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings were received on November 30, 2010. These drawings are unacceptable (see below).
2. Again, the drawings filed November 30, 2010 (it appears applicant has submitted the exact same drawings that were present before) are objected to because Figs. 2-7 are not clear and cannot be understood as they are of such poor quality and lack any reference designations whatsoever. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 18 says "The process as claimed in claim 1" but there is no process in claim 1. It appears applicant meant either claim 16 or 17.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 15-19 and 22-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 15 and 23 appear to be combination claims with claim 1 but repeat much of what is already in claim 1 thus the metes and bounds of the claim are unclear. Claims 16-19 and 22 are process claims (but the base of the claim is written as an apparatus claim) based on apparatus claim 1 but again repeat much of what is already in claim 1. Claims 16-19 and 22 are also seen as possible product by process claims and the statute is applied below. The metes and bounds of the claims 16-19 and 22 are completely unclear and the examiner recommends cancelling these claims.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 3-6, 8-12, 15-16, 18 and 23, as understood, are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Willis US 6,314,317.

Regarding claim 1, Willis discloses all the claim features including, an electrically controlled fluidic valve 10 (Fig 2) separating two volume spaces comprises at least one microporous membrane 13 (Fig 2) having approximately circular pores 14 (Fig 2) of approximately constant diameter (Col 5, lines 34-35), wherein the pore diameter lies in the range from .2  $\mu\text{m}$  -1  $\mu\text{m}$  (Col 5, lines 44-51, “.1  $\mu\text{m}$  to about 10  $\mu\text{m}$ ”) clearly this falls in the claim range and since this teaching would lead someone to use those pore sizes the reference meets the claimed limitation, the surface of the microporous membrane 13 (Fig 2) is at least partly covered with at least one electroactive polymer 20 (Fig 3)

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essentially placed within the pores 14 (Fig 2/Col 2, lines 16-18) of said microporous membrane 13 (Fig 2), so that, when said polymer is in a defined oxidation-reduction state (Col 7, lines 4-13) and said valve is in a closed state in an electrolytic salt solution (phosphate buffered saline, PBS, pH 6.5) comprising an ion having high steric hindrance (Fig. 5, anion is added and subtracted to close and open the pore, thus inherently has high steric hindrance as the anion moves back and forth and does not become part of an unwanted side reaction), said polymer blocks off said pores (Col 1, lines 38-42) of said microporous membrane by incorporating the ion having high steric hindrance; and an electrical supply (Col 16, lines 3- 8) intended to allow said valve to switch from the closed state (Fig 3A) to an open state (Fig 3B), and vice versa, by changing the oxidation-reduction state of the electroactive polymer 20 (Fig 3). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the pore diameter to be .2  $\mu\text{m}$  to be small enough but not too small. Regarding claim 3, Willis discloses the electrical (Col 16, lines 3-8) supply has at least one electrode ("working electrode" Col 16, line 7) and at least one counterelectrode ("auxiliary electrode" Col 16, lines 7-8).

Regarding claims 4 and 5, Willis discloses that the electrode is formed by the microporous membrane ("non-conductive material" Col 6, lines 17-19); characterized in that the microporous membrane 13 (Fig 2) is made of a nonconductive material (Col 5, lines 13-14).

Regarding claim 6, Willis discloses that the nonconductive material is "NUCLEOPORE7 - a polycarbonate" (Col 5, lines 24-30).

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Regarding claim 8, Willis discloses that the membrane further includes at least one external metal layer (Col 5, lines 63-65).

Regarding claim 9, Willis discloses that the membrane further includes at least one intermediate polymeric layer to which the external metal layer is fastened (Col 6, lines 13-16).

Regarding claims 10 and 11, Willis discloses that the microporous membrane is made of a conductive material (Col 5, lines 21-24); characterized in that the conductive material is a metal taken from the group comprising: gold, platinum, palladium or any other equivalent material (Col 5, lines 18-24).

Regarding claim 12, Willis discloses that the electroactive polymer is a conjugated polymer such as polyaniline (Col 2, lines 44-49).

Regarding claim 15, Willis discloses a microfluidic device, characterized in that it includes at least one valve (Col 4, lines 54-58) wherein ions having high steric hindrance are incorporated into the polymer when the at least one valve is in the closed position, and ions having high steric hindrance are expelled from the polymer when the at least one valve is in the open position.

Regarding claim 16, Willis discloses a process for producing a valve characterized in that it comprises the following steps: a) a microporous membrane is placed in an electrolytic solution containing at least one monomer (Col 9, lines 6-14) and an electrolytic salt, wherein the electrolytic salt comprises an ion having high steric hindrance; b) an electrochemical current is induced in said electrolytic solution (Col 9, lines 32-35); c) the monomer is fixed on to the microporous membrane, and especially

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in the pores of said membrane (Col 9, lines 13-21); d) the radial polymerization of the monomer in the pores of said membrane is carried out (Col 9, lines 13-21) in the presence of the ion having high steric hindrance; and e) the polymerization is stopped by cutting off the electrochemical current when the polymers reach the center of the pores, so that said polymers block the pores without overlapping one another (Col 10, lines 23-33) by incorporating the ion having high steric hindrance. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product in the prior art, the claim is unpatentable even though the prior product was made by a different process (see MPEP 2113).

Regarding claim 18, as understood, Willis discloses a process characterized in that the monomer is taken from the group comprising: pyrrole, thiophene and derivatives thereof (Col 8, lines 12-17).

Regarding claim 23, Willis discloses a microfluidic device that acts as an analysis card, wherein the card manages and/or separates species in a fluid by positioning the at least one valve in a closed position where ions having high steric hindrance are incorporated into the polymer of the at least one valve, and switching the at least one valve to an open position in which ions having high steric hindrance are expelled from the polymer.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Willis (US 6,314,317) in view of Campbell (US 3,681,209).

Regarding claim 7, Willis discloses all the claimed features except for, the nonconductive material is a polymer such as, cellulose nitrate. Campbell teaches



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wherein the nonconductive material is a polymer taken from cellulose esters or cellulose nitrates (Col 2, lines 34-44). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device in Willis to select the nonconductive material of cellulose nitrate, as taught and suggested by Campbell, for the purpose providing a membrane made of a nonconductive material that has high cohesive strength (Col 1, lines 13-20).

11. Claims 17 and 19, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Willis (US 6,314,317) in view of Irie (US 5,314,606).

Regarding claim 17, Willis discloses all the claimed features including, a prior step of metalizing (Col 6, lines 30-33) the microporous membrane when said membrane is made of a nonconductive material (Col 5, lines 24-30), said metallization step comprising the following substeps:

a') a microporous membrane is placed in a monomer solution (Col 6, line 30; Col 9, lines 13-14); b') the monomer is fixed onto the microporous membrane (Col 9, lines 13-21); c') the polymerization of the monomer is carried out over the entire surface of the membrane so as to obtain a polymer layer (Col 9, lines 6-12), except for, d') the membrane thus obtained is placed in a solution containing at least one metal salt; and e') the electrodeposition of the metal on the polymer layer is carried out by an oxidation-reduction reaction so that the microporous membrane is covered with a metal film. Irie teaches, d') the membrane thus obtained is placed in a solution containing at least one metal salt (Col 4, lines 22-35); and e') the electrodeposition of the metal on the polymer layer is carried out by an oxidation-reduction reaction so that the microporous

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membrane is covered with a metal film (Col 4, lines 22-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the process in Willis to include steps "d)" and "e)", as taught and suggested by Irie, for the purpose of coating the microporous membrane with a suitable metal layer to gain the advantages and desired characteristics of the metal.

Regarding claim 19, Willis discloses all the claim features except for the metal salt is gold chloride. Irie teaches that the metal salt is gold chloride (Col 4, lines 40-44).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the process in Willis to include a metal salt of gold chloride, as taught and suggested by Irie, for the purpose of coating the microporous membrane with a metal layer of gold compound to gain the advantages and desired characteristics of the gold compound, such as resistance to corrosion.

12. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Willis (US 6,314,317) in view of Shikida et al. (US 5,284,179).

Regarding claim 20, Willis discloses the microporous membrane having a thickness of 1-20  $\mu\text{m}$  but lacks the thickness being 25-30  $\mu\text{m}$  (the examiner would like to note that the applicant discloses the microporous membrane of lying within a range of 10  $\mu\text{m}$  to 1 mm, preferably from 10 to 30  $\mu\text{m}$  which Willis meets) and elapsed time of the valve switching from closed to open is 1-100 milliseconds. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thickness of the membrane of Willis from 20  $\mu\text{m}$  to be 25  $\mu\text{m}$  as this is merely a 25% increase in size and would be obvious to make it slightly thicker to make it less prone to

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breaking and also a change in size is an obvious matter of design choice that is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). Shikida discloses opening and closing the valve in several tens milliseconds. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the switch time of the valve of Willis be within several tens milliseconds as disclosed by Shikida to provide a fast switch time for opening and closing the valve.

13. Claims 21-22, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Willis (US 6,314,317) in view of Murray (US 4,716,138).

Regarding claims 21-22, Willis discloses the ion having high steric hindrance is an anion but lacks the type of electrolytic salt. Murray discloses lithium paratoluenesulfonate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use lithium paratoluenesulfonate as disclosed by Willis as the electrolytic salt of Willis as a matter of simple substitution.

### ***Response to Arguments***

14. Applicant's arguments with respect to claims 1, 3-12, and 15-23 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Bastianelli whose telephone number is (571) 272-4921. The examiner can normally be reached on M-Th (8-6:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Hepperle can be reached on (571) 272-4913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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